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Draghetti

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[54] **STATISTICAL VENTILATION CONTROL DEVICE FOR VENTILATED CIGARETTES**

[75] Inventor: **Fiorenzo Draghetti**, Medicina, Italy

[73] Assignee: **G.D Societa' Per Azioni**, Bologna, Italy

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[5] **A24C 5/34**

[52] **U.S. Cl.** **131/281**; 131/904; 131/908; 209/535

[58] **Field of Search** 131/280, 281, 904, 905, 131/908, 907, 910; 73/38, 40; 209/535, 537, 539

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Primary Examiner—Mark S. Graham
Assistant Examiner—J. Doyle
Attorney, Agent, or Firm—Marshall, O'Toole, Gerstein, Murray & Borun

[57] **ABSTRACT**

A statistical ventilation control device for ventilated cigarettes, wherein an annular conveyor presents a number of seats, each receiving a respective ventilated cigarette arranged perpendicular to the traveling direction of the conveyor; one of the aforementioned seats being a movable seat supported on a slide fitted to the conveyor so as to move the movable seat axially in relation to the conveyor and to and from an operating position wherein a ventilated portion of the cigarette engages a ventilation control unit fitted to and moving with the conveyor.

6 Claims, 4 Drawing Sheets

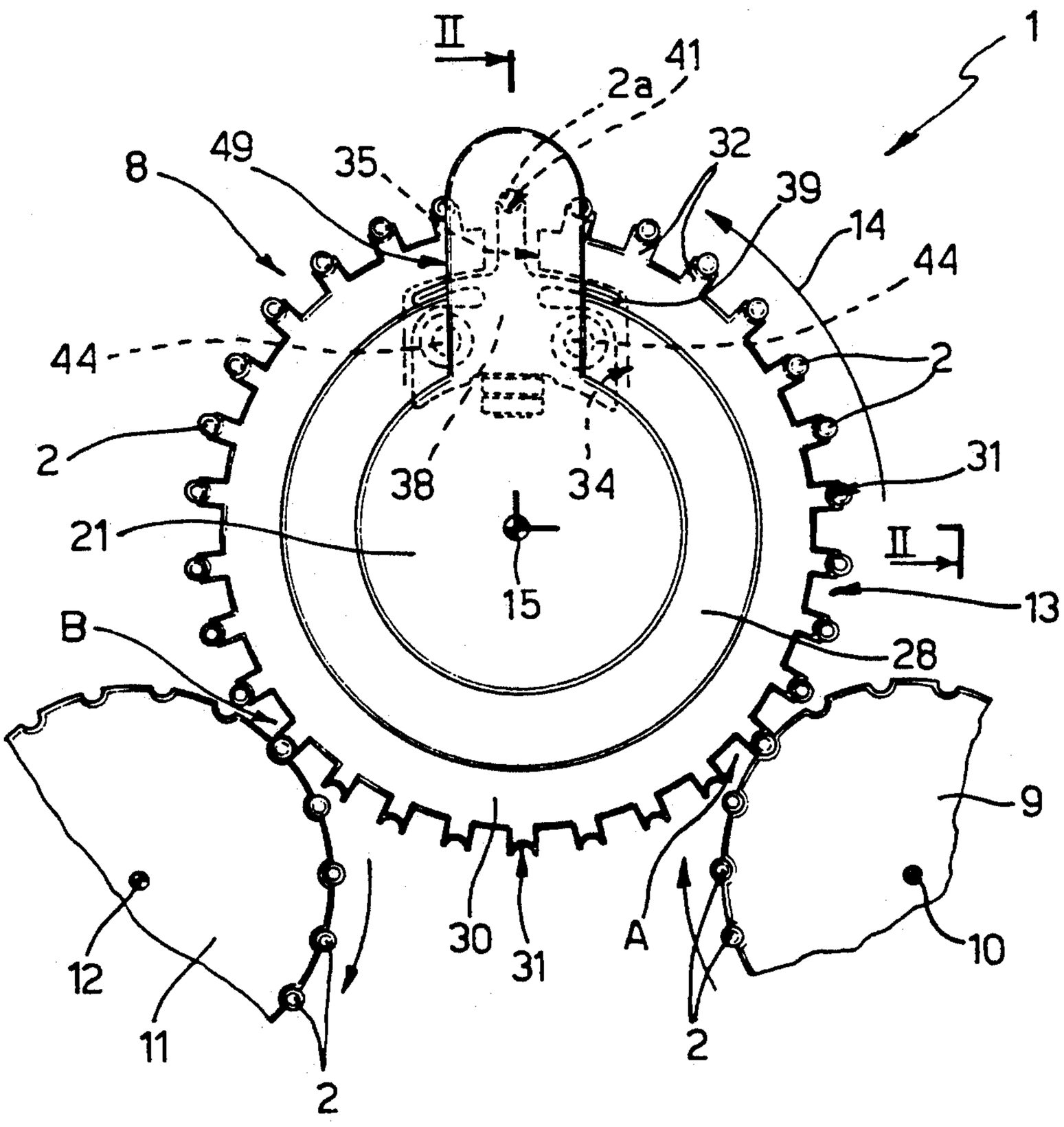
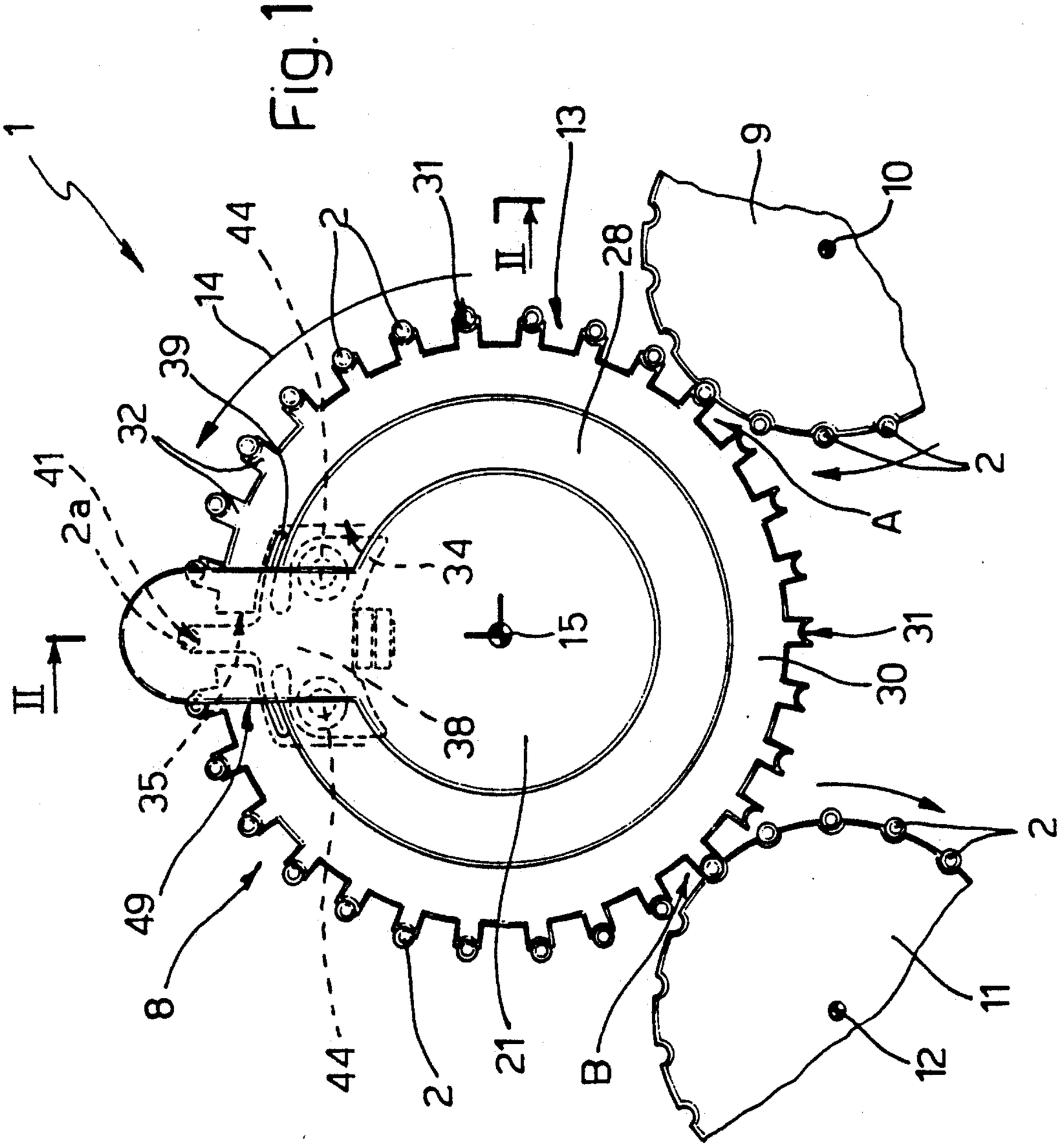


Fig. 1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2a
II
II
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49
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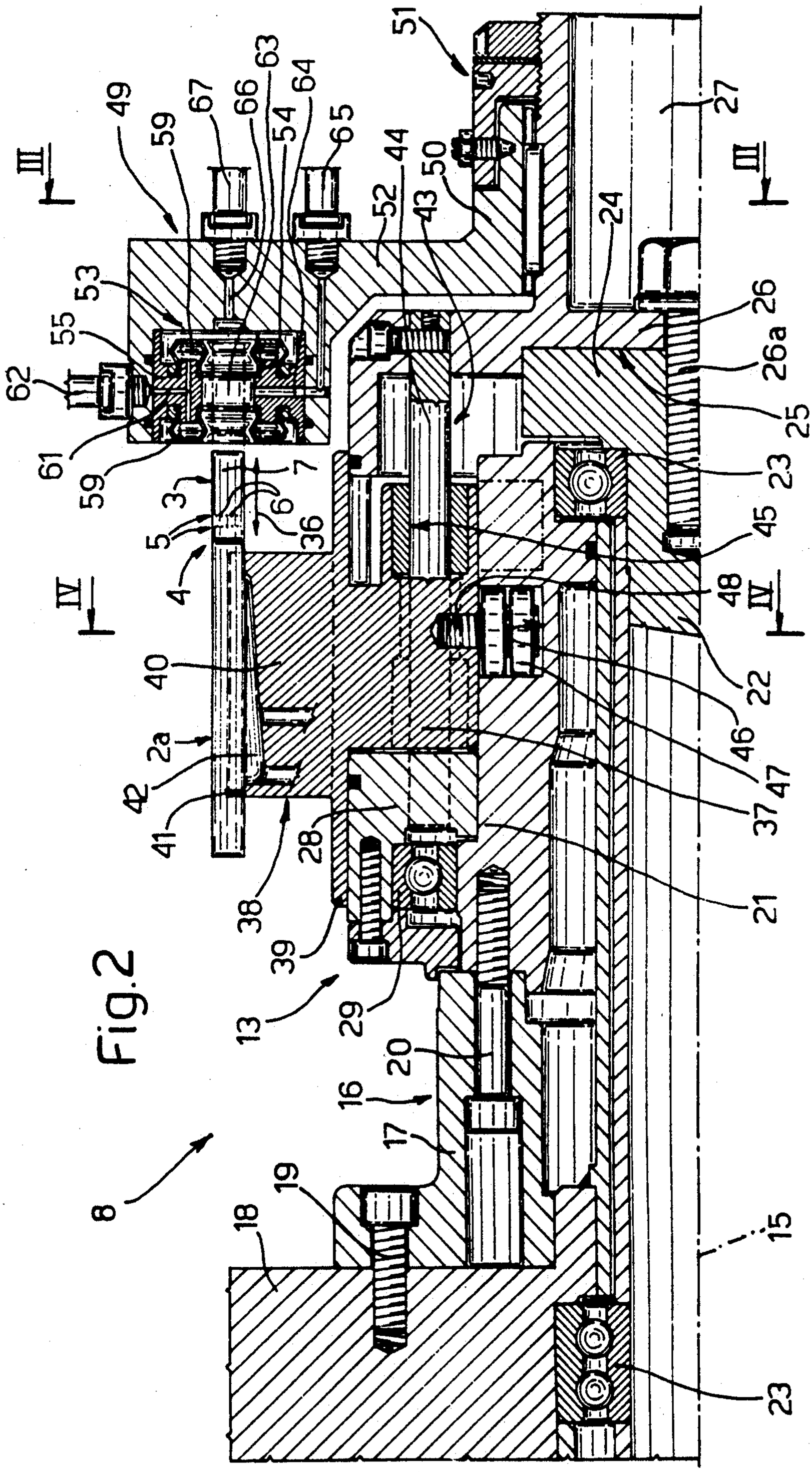
28
9
10
A
2
31
30
2
11
12
B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24
III
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55
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61
59
26
26a
25
23
45
48
IV
IV
7
3
6
5
36
4
40
2a
42
41
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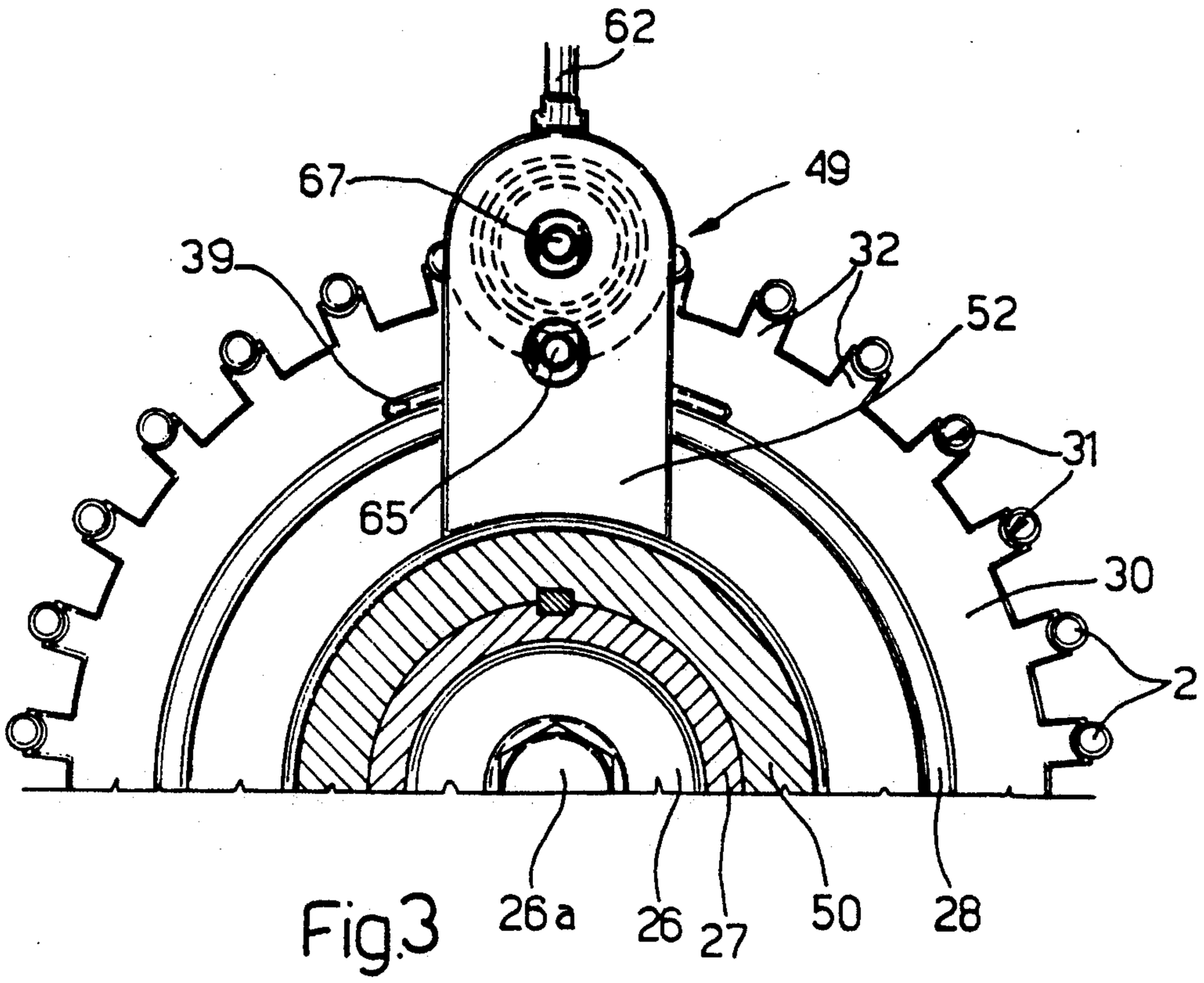
Fig.2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32
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2
26a
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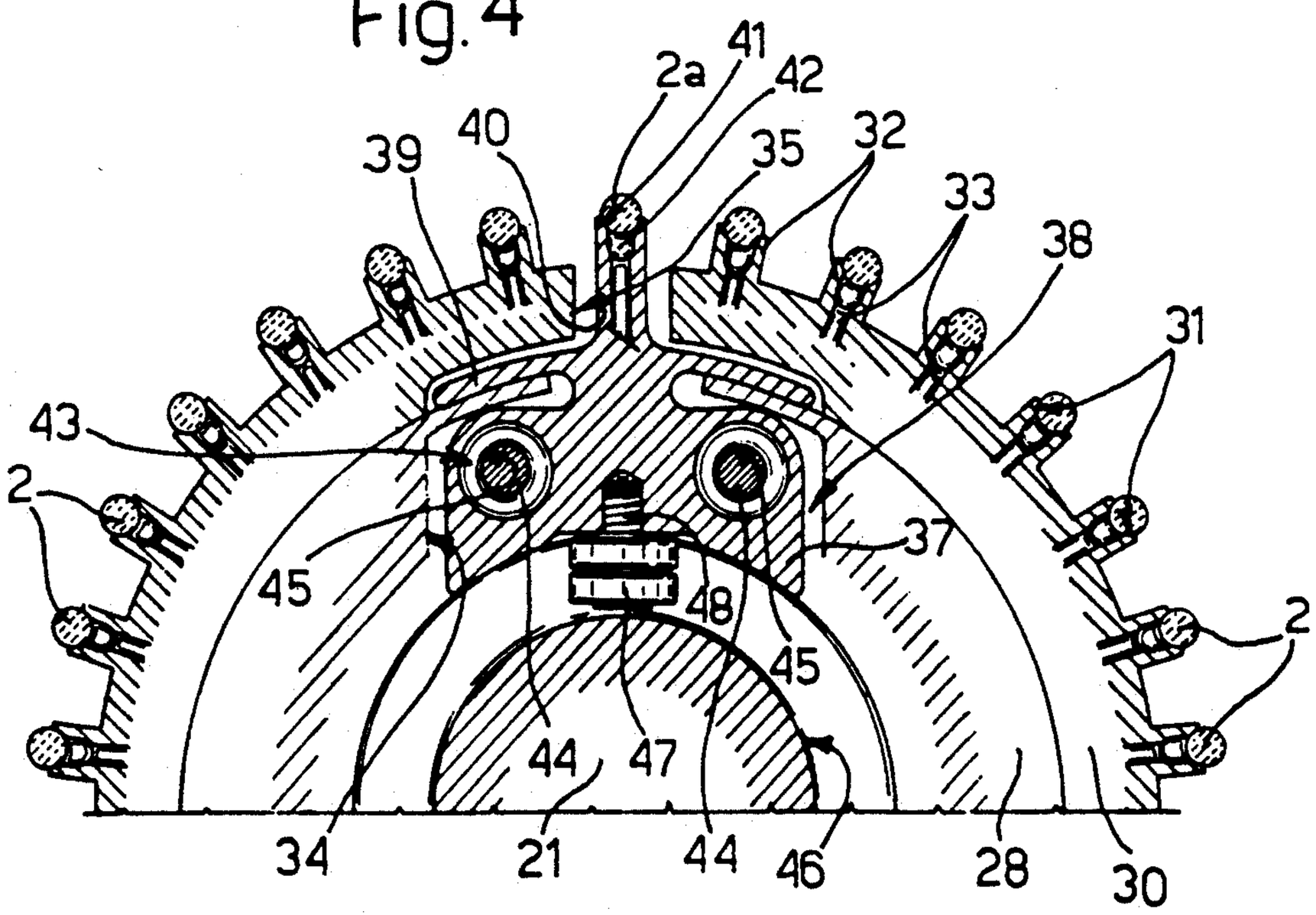
Fig.3

Fig.4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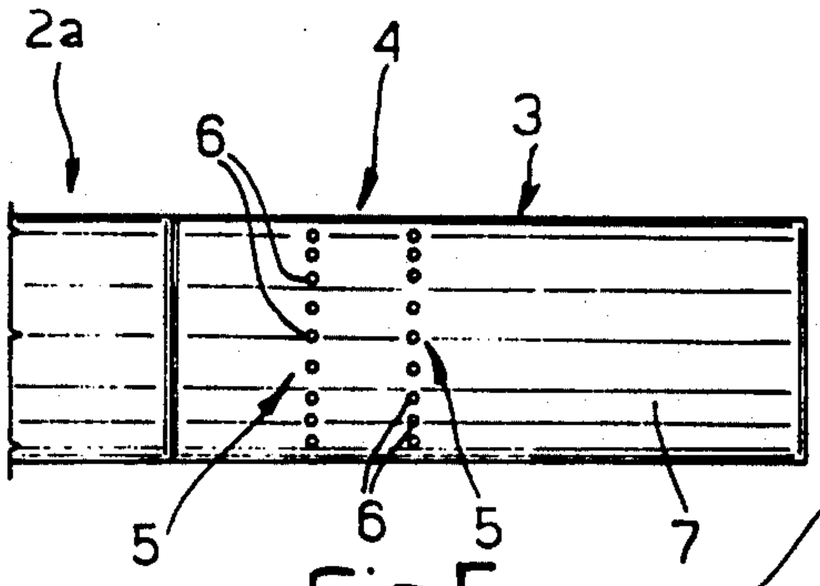
2a
4
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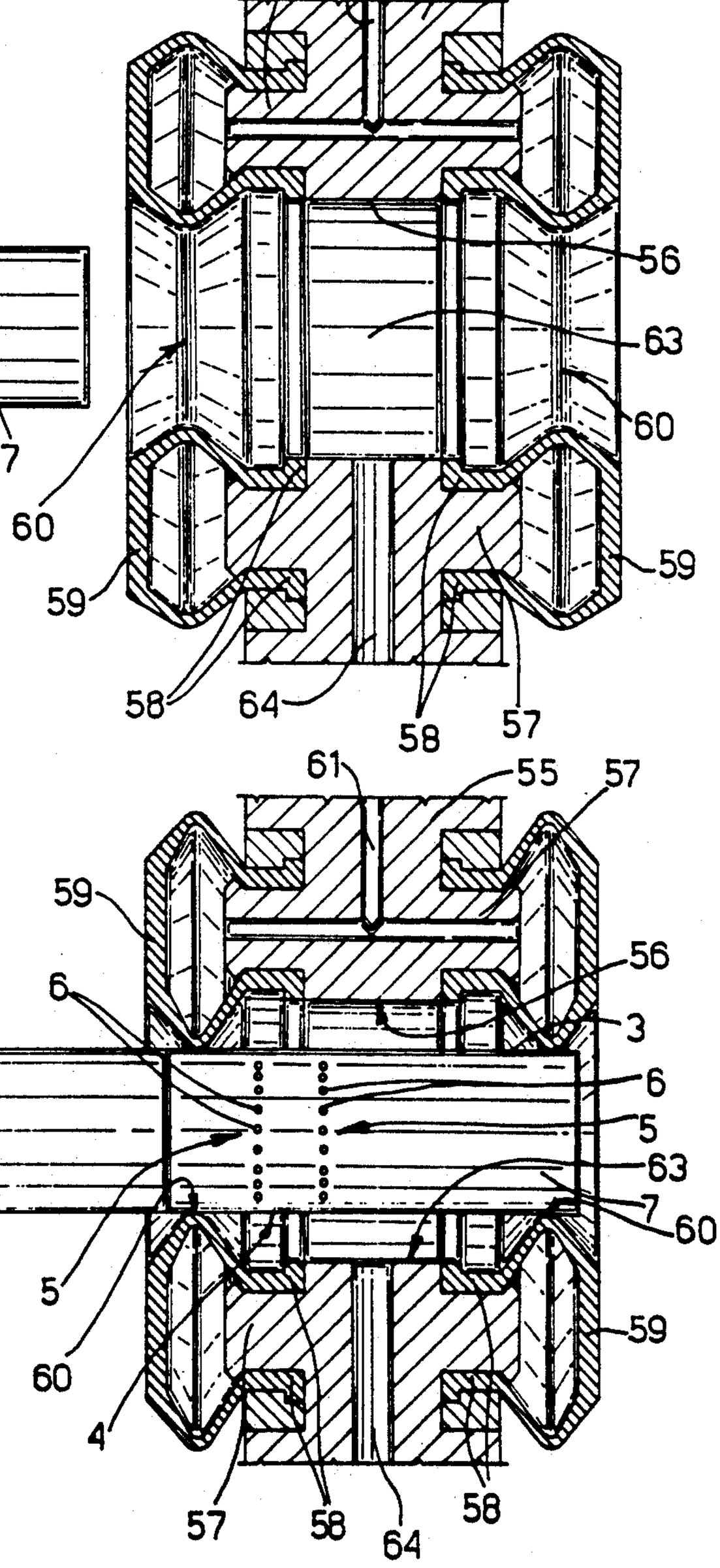
Fig.5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64
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Fig.6

STATISTICAL VENTILATION CONTROL DEVICE FOR VENTILATED CIGARETTES

BACKGROUND OF THE INVENTION

The present invention relates to a statistical ventilation control device for ventilated cigarettes.

Ventilated cigarettes normally consist of a filter-tip cigarette, the cover band of the filter of which presents ventilation holes formed by means of perforating devices, for enabling the smoker to inhale, together with the smoke produced by combustion of the tobacco, a certain amount of air for reducing both the temperature and the amount of harmful substances contained in the smoke.

During manufacture, ventilated cigarettes are normally subjected to constant hundred percent control to determine "ventilation" performance and so enable rejection of any poorly ventilated cigarettes as well as continuous adjustment of the perforating devices.

In actual practice, however, hundred percent control has proved not only relatively expensive and, in view of the limited time available, invariably unreliable, but also substantially superfluous, by virtue of any change in ventilation performance occurring in the form of "tendencies" as opposed to random, sharp variations. As such, statistical ventilation control (e.g. one out of every thirty cigarettes) has been found to be no less effective than hundred percent control, and is decidedly cheaper and more reliable by virtue of the smaller number of cigarettes involved and, hence, the additional time available for control.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a device enabling statistical ventilation control of ventilated cigarettes.

According to the present invention, there is provided a statistical ventilation control device for ventilated cigarettes, each having a ventilated portion with lateral ventilation holes; characterized by the fact that it comprises an annular conveyor; a number of seats on the conveyor, arranged side by side and perpendicular to the traveling direction of the conveyor, said seats being each designed to receive a respective cigarette, and comprising a number of seats fixed in relation to the conveyor and at least one seat moving axially in relation to the conveyor; movable supporting means located between said movable seat and the conveyor; a unit for controlling the ventilation, through said ventilation holes, of a cigarette housed inside said movable seat, said control unit moving with said conveyor in said traveling direction, and facing an axial end of said movable seat; and actuating means for moving said movable supporting means to and from an operating position wherein the ventilated portion of said cigarette housed inside said movable seat engages said control unit.

Said movable supporting means preferably comprise a slide fitted with said movable seat and mounted on the conveyor so as to slide, in a direction perpendicular to said traveling direction, between said operating position and an idle position wherein said movable seat is aligned transversely with said fixed seats.

At each turn of the annular conveyor, therefore, at least one cigarette engages the control unit, which, by the time the cigarette is restored to the idle position on the conveyor, is allowed relatively ample time for determining the efficiency of the ventilation holes and, if necessary, regulating the perforating devices upstream from the annular conveyor.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

FIG. **1** shows a schematic side view, with parts removed for simplicity, of a portion of a filter assembly machine comprising a ventilation control device in accordance with the teachings of the present invention;

FIG. **2** shows a section along line II—II in FIG. **1**;

FIG. **3** shows a schematic section along line III—III in FIG. **2**;

FIG. **4** shows a schematic section along line IV—IV in FIG. **2**;

FIGS. **5** and **6** show enlarged views of a detail in FIG. **2** in two different operating positions.

DETAILED DESCRIPTION OF THE INVENTION

Number **1** in FIG. **1** indicates a filter assembly machine for producing cigarettes **2**, each comprising a filter **3** (FIGS. **5** and **6**) having a ventilated portion **4** defined, in the example shown, by two rings **5** of substantially radial holes **6** formed through the cover band **7** of filter **3**.

Machine **1** comprises a device **8** for controlling the ventilation of cigarettes **2**, and defined by an input conveyor roller **9** rotating clockwise (in FIG. **1**) about axis **10**; an output conveyor roller **11** rotating clockwise (in FIG. **1**) about axis **12**; and an intermediate conveyor roller **13** rotating in anticlockwise direction **14** (in FIG. **1**) about axis **15** parallel to axes **10** and **12**, and tangent to rollers **9** and **11** at respective cigarette loading and unloading stations A and B.

As shown in FIG. **2**, roller **13** presents a tubular support **16** coaxial with axis **15** and comprising a tubular body **17** having a first flanged end connected integral with a supporting wall **18** by screws **19**, and a second end connected, by screws **20**, integral with one end of a tubular drum cam **21** coaxial with axis **15** and forming part of tubular support **16**.

Wall **18** and tubular support **16** are fitted through with a drive shaft **22** connected for rotation to wall **18** and support **16** via the interposition of bearings **23**, and having, on the end projecting from the free end of cam **21**, a cylindrical head **24** engaging a cylindrical axial recess **25** in a plate **26** coaxial with axis **15** and connected integral with head **24** by means of a central axial screw **26***a*.

Plate **26** presents, on one side, a tubular appendix **27** coaxial with axis **15** and projecting from the opposite surface of plate **26** to that with recess **25**; and, on the other, a cylindrical tubular body **28** coaxial with axis **15**, extending outwards of cam **21**, and connected for rotation to the outer surface of cam **21** via the interposition of a bearing **29**.

As shown in FIGS. **3** and **4**, tubular body **28** is fitted with a sleeve **30**, the outer surface of which presents a number of equally-spaced seats **31**, hereinafter referred to as "fixed seats", each formed along the end of a respective axial rib **32** integral with sleeve **30**, and having a suction device **33** for retaining a respective cigarette **2**. As roller **13** is rotated in direction **14** about axis **15** by the torque transmitted by drive shaft **22**, each fixed seat **31** receives a respective cigarette **2** from input roller **9** at

loading station A, and feeds it over arc A-B and on to roller **11** at unloading station B.

As shown particularly in FIG. **4**, tubular body **28** presents a radial through opening **34** facing a longitudinal recess **35** formed through sleeve **30**.

As shown in FIG. **2**, in which sleeve **30** is omitted for the sake of simplicity, opening **34** is engaged in sliding manner, in direction **36** parallel to axis **15** and perpendicular to direction **14**, by the foot **37** of a slide **38**, which comprises an intermediate flange **39** cooperating in sliding manner with an outer surface portion of tubular body **28** surrounding opening **34**; and a head **40** engaging recess **35** in sliding manner (FIG. **4**), and the free end of which presents a seat **41**, hereinafter referred to as the "movable seat", located between two fixed seats **31**. Movable seat **41** presents a respective suction device **42**, similar to devices **33**, for retaining a respective cigarette **2**, hereinafter referred to as cigarette **2***a*, and is located parallel to and the same distance from axis **15** as seats **31**.

Slide **38** slides inside opening **34** in direction **36** and along a slideway **43** defined by two rods **44** fitted to tubular body **28** and extending along opening **34** in direction **36** so as to engage in sliding manner respective through holes **45** formed in foot **37** of slide **38**. The movement of slide **38** along slideway **43** is controlled by cam **21**, which presents an outer annular groove **46** engaged by a tappet roller **47** supported on a pin **48** projecting radially from the inner end of foot **37**.

As shown more clearly in FIG. **2**, device **8** comprises a unit **49** for controlling the ventilation of cigarette **2***a*, i.e. instantaneous air flow through holes **6** in ventilated portion **4** of cigarette **2***a*, when portion **4** is subjected directly and externally to a given vacuum.

Unit **49** comprises a sleeve **50** fitted and locked axially to appendix **27** by a ring nut clamping device **51**; an appendix **52** extending radially outwards from the end of sleeve **50** facing plate **26**; and a suction and control device **53** housed inside a cavity **54** formed on appendix **52** and facing the end of movable seat **41**.

As shown more clearly in FIGS. **5** and **6**, device **53** comprises a ring **55** fitted inside cavity **54**, coaxial with movable seat **41**, and having an axial through hole **56** and two opposite annular end ribs **57**. Each rib **57** is fitted in fluidtight manner with the opposite lips **58** of a respective bellows type annular air chamber **59** coaxial with ring **55** and having a deformable inner annular edge **60** coaxial with hole **56**. Via holes **61** formed in ring **55**, air chambers **59** communicate with a suction device **62** (FIG. **2**), operation of which provides for axially depressing air chambers **59** and flexibly reducing the diameter of edges **60** from a first (FIG. **5**) to a second diameter respectively greater and smaller than the diameter of cigarette **2***a*.

As shown in FIGS. **5** and **6**, air chambers **59** and ring **55** define, between edges **60**, a control chamber **63** communicating, via a radial hole **64** in ring **55**, with a suction device **65** (FIG. **2**) and engaged by a portion of cigarette **2***a*, in this case, filter **3** with ventilated portion **4**. For this purpose, groove **46** of cam **21** is so formed as to move slide **38** from an idle position (FIGS. **2** and **5**) wherein ventilated portion **4** of cigarette **2***a* is located outside chamber **63** and movable seat **41** is aligned transversely with fixed seats **31**, to an operating position wherein ventilated portion **4** of cigarette **2***a* engages chamber **63**.

Finally, as shown in FIG. **2**, cavity **54** communicates, via an axial hole **66** formed through appendix **52**, with a further (optional) suction device **67**, for measuring the permeability of cigarette **2**.

In actual use, at each passage through loading station A, movable seat **41** receives a cigarette **2***a* from roller **9**, which it feeds over arc A-B on to roller **11** at unloading station B. Groove **46** is so formed as to maintain slide **38** in the idle position as it travels through station A and B and over arc B-A, and in the operating position as it travels over substantially the whole of arc A-B. Consequently, once past station A, slide **38** moves in direction **36** into the operating position, so that filter **3** of cigarette **2***a* engages chamber **63**, and ventilated portion **4** of cigarette **2***a* is positioned between annular edges **60** of air chambers **59**. When the air in chambers **59** is removed by suction device **62**, chambers **59** mate in fluidtight manner with filter **3** along respective edges **60**, and chamber **63** is closed.

Operation of suction device **65** at this point provides for drawing in outside air solely through ventilation holes **6**, which air is fed by suction device **65** to a known control device (not shown) for measuring the air flow through holes **6** when subjected by device **65** to a given vacuum. The resulting air flow values are compared in known manner with correct values, for generating, if necessary and in known manner, error signals for adjusting known perforating devices (not shown) by which holes **6** are formed.

The time available for measuring air flow through holes **6** is therefore substantially equal to the time taken by seat **41** to travel over arc A-B, which is thus sufficient for enabling extremely accurate measurements using only one control unit **49**.

Obviously, for a given number of seats **31** on roller **13**, the frequency of the statistical control as described above may be increased by fitting roller **13** with two or more units **49** and respective slides **38**.

I claim:

1. A statistical ventilation monitoring device comprising:

an annular conveyor having a plurality of seats thereon, adapted to receive a ventilated cigarette therein, which move with said conveyor along an annular path, said seats including a plurality of fixed seats fixed relative to said conveyor and at least one movable seat movable in a direction perpendicular to said annular path;

ventilation control means for monitoring the ventilation of a cigarette received in said at least one movable seat, said ventilation control means moving with said conveyor along said annular path;

a movable supporting means between said conveyor and said movable seat for supporting said movable seat; and

actuating means for moving said movable supporting means in said perpendicular direction into and out of an operating position in which a cigarette received in said movable seat engages said ventilation control means.

2. A device as claimed in claim **1**, wherein said movable supporting means comprise a slide supporting said movable seat and mounted on the conveyor so as to slide in a direction, perpendicular to said traveling direction, between said operating position and an idle position wherein said movable seat is aligned transversely with the fixed seats.

3. A device as claimed in claim **1**, wherein said conveyor comprises a drum mounted for rotation about its axis in said traveling direction.

4. A device as claimed in claim 3,

wherein said actuating means comprise cam means connected to said movable supporting means for moving said supporting means to and from said operating position at each complete turn of said annular conveyor.

5. A device as claimed in claim 1, wherein said ventilation control means comprises a chamber means; closing means fitted to said chamber means and adapted to mate with a cigarette received in said movable seat for rendering said chamber means fluid-tight about the cigarette; and suction means for removing air from said chamber means.

6. A device as claimed in claim 5, wherein said chamber means comprise a ring, and said closing means comprise two bellows type annular air chambers on either side of and supported on said ring; each said air chamber being coaxial with said ring and having an inner annular edge having a given diameter and adapted to mate in fluidtight manner with the outer surface of a cigarette received in said movable seat; further suction means (62) being connected to said air chambers for reducing the diameter of said inner annular edges from a first to a second diameter respectively greater and smaller than the diameter of the cigarette.

* * * * *